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A MAGAZINE DEVOTED TO THE INTERESTS OF

NATURAL HISTORY IN ALL ITS BRANCHES.

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THE COLLECTOR A CIVILIZER.

IN that very pleasant little volume "Ferns in their Homes and Ours," the author, "in conclusion," calls attention to the fact that a hobby of some sort is an important adjunct and healthy stimulant to the development of individual taste and culture. He says: "Without an object we walk aimlessly, we read aimlessly. The child who collects postage-stamps learns something of geography, and the coin-collector must acquire something of history, that he may properly arrange his coins." And again, "There is a large class of persons who are so fortunate (or unfortunate, according as they use or abuse the privilege) as to have nothing to do; or, to speak more exactly, have to do only what they choose. This class must have a hobby or they will *rust* out. Another class is engrossed by incessant professional work which leaves them every day cross and tired. These should have some outside hobby, or they will become one sided and crabbed, and *wear* out. Every person, old or young, outside of an asylum for the insane, should have some one thing in which an intellectual interest is taken,—some hobby, or something that may grow into one . . . and that whether pursued in a scientific way or only as a pastime, it can in any event do no harm, but may be the cause of great and permanent good."

To this we add the testimony of the eminent naturalist and popular scientific instructor, Prof. Edw. S. Morse, who has but just returned from an engagement at the University of Tokio, in Japan. In a recent lecture upon the people of that wonderful country, he spoke of the antiquity of the custom which prevails there of collecting something. He said he had seen numerous collections of porcelain ware and pottery that contained

articles more than nine hundred years old, of Japanese manufacture, and that collectors have there had what is called the "Keramic craze" for centuries, and instead of dying out the fever had always been upon a steady increase. This is accounted for by the fact that for centuries the Japanese had been at peace, with but few exceptions; and in times of peace, culture and the arts made rapid progress, and that appreciative people were ever ready to possess themselves of the art treasures, and as in Europe, vying with each other to own the rarest and most beautiful work of the artist: hence these splendid collections of pottery, swords, carvings, wall screens, and the like to be found in Japan. Comparing this with other countries he generalized that collecting was a sure mark of prosperity, culture and refinement with any people, that the extent of these qualities in a nation could be estimated, as well as any way, by the collectors among the people. It was so with ancient Egypt, Greece and Rome, it is so with modern Europe and so always with advanced Oriental nations. Americans, always too busy building themselves cities and arranging great schemes of railway or telegraph, have but recently had the time to settle down to the quiet of collecting and scientific study. The last half century has wrought a vast change with us, and has done an immense amount towards elevating us to the position now attained by European States. Our Museums and Libraries have developed beyond all expectations, and scientific work has progressed faster than the supply of money to pursue it could be raised. And to this general work are to be added the labors of the home student and private collector who, however humble, are adding a share to the great work of refinement. By the establishment of public museums the idle visitor, spending a spare hour lounging about the exhibition halls, cannot fail to acquire some little information from the great object-lesson before him, or become more familiar with the labors and requisites entailed by any such great work.

A generation, growing up under the influence of collections and familiar with them, cannot fail to imbibe a desire to add to their value. The managers of our literary magazines and newspapers do not now feel that they have done their duty, unless some portion of space is devoted to the scientific news or the recent discoveries by the naturalists. All this betokens a great future for our people and one that will demand more thought from the publisher, and rarer and more useful books for the student. It does away in a great measure with superstition; and, by the great accessibility to books and collections, teaches the natural laws and causes of many unaccountable phenomena to those who otherwise would live in ignorance.

HINTS ON TAXIDERMY.

Equipment for the travelling collector.—The travelling collector should equip himself with a double-barrelled gun (and a rifle when large animals are sought for), ammunition, including shot for small birds and mammals (numbers 2, 6, 8 and 10,—the latter should never be omitted); dissecting instruments, scissors, needles and thread, preservative drugs and preparations, and alcohol about 80 per cent. in strength; tin cans of various sizes for containing alcoholic specimens, since glass bottles and jars are liable to be broken during transportation; cotton and tow for stuffing the skins of birds and mammals; fishing lines and hooks, casting net, a seine for catching fishes in small streams, the two ends of which should be secured to long wooden handles, which are held in the hands of two persons upon opposite banks; in this position it can be drawn both up and down the stream. He should also carry with him a geological hammer and steel chisels for collecting fossils and rock specimens, and small pocket vials and cork-lined boxes for insects.

Preservatives.—Common powdered arsenic should be employed for skins to be mounted at once, instead of arsenical soap, as it has a tendency to dry them quickly. It may be applied dry, or mixed with alcohol until it is of the consistency of syrup; in the former case it should be dusted upon the skin by means of a small sieve; in the latter it is necessary to apply it with a brush. Arsenical soap should be used only upon skins which are intended to be kept for a long time before being mounted. It is composed of the following ingredients: powdered arsenic ½ lb., camphor 1¼ lbs., salts of tartar 3 oz., powdered lime 1 oz., bar soap ½ lb.

The soap should be cut into very fine slices, put into a tin dish with warm water, and stirred over a moderate fire until thoroughly dissolved; the powdered lime and salts of tartar should then be added and mixed with the soap. The preparation should next be removed from the fire, the powdered arsenic, and lastly the camphor (powdered and dissolved in a little alcohol) added, stirring the mixture all the while. The whole should have the consistency of flour paste; if it be too thick add a little water, taking care not to hold it over the fire after the camphor has been added, as heat will cause the latter to evaporate speedily. After cooling it place it in a jar with the brush passing through the stopper, and label the jar "*poison.*" In extreme cases when the above preparations cannot

be obtained, the skin should be rubbed with salt or with alum, or filled with spices and strong smelling herbs. These are by no means a substitute for arsenic, and are to be used only when the latter cannot be obtained. The skins of large animals should be soaked in a solution of alum, arsenic and salt, or in weak arseniated alcohol for several days.

Directions for preliminary work.—When a specimen has been killed, the mouth should be opened, cleaned and filled with cotton or tow; the nostrils and vent, and any wounds should be treated in the same way to prevent blood or other secretions from exuding. It is essential to remove the skin as soon as possible after death. Should this be inconvenient, the internal organs should be taken out and the cavity filled with powdered charcoal if it can be had, if not, salt should be used. Previous to removing the skin, an accurate measurement should be taken of the subject in the manner indicated below.*

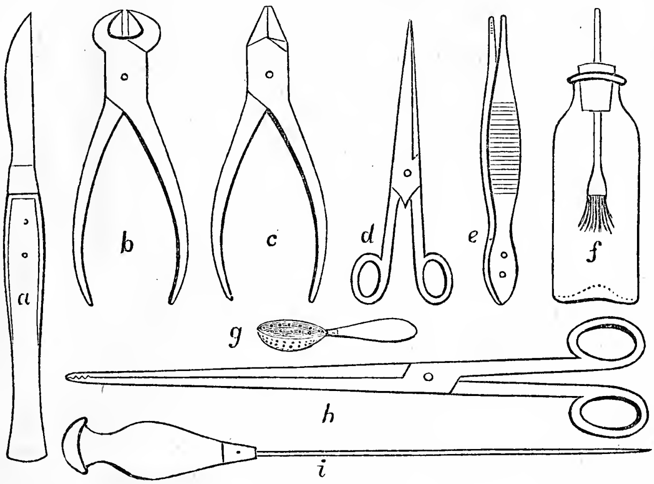
The color and general character of the hair, as well as any change of the same at different seasons of the year, the sex, and any other peculiarity known should be carefully written down and preserved. Skins should never be packed for transportation until thoroughly dry; they should then be placed in a box containing plenty of camphor, having its sides and joints perfectly closed with pitch to prevent the invasion of insects. It is well to saturate the inside of the box with benzine before placing the skins within. Never allow a box containing skins to be placed in any damp place.

Instruments and materials used.—Of instruments and materials useful to the taxidermist in mounting mammals, birds, fishes and reptiles, the following are needed: A scalpel, (*a*); a pair of pincers for bending wire, (*c*); a pair of wire cutters (*b*); a pair of small forceps for stuffing the necks of *small* birds and mammals and arranging feathers (*e*); a pair of larger ones, at least fifteen inches long, for stuffing the necks of *large* birds and mammals (*h*); a pair of dissecting scissors for cutting flesh and ligaments during the process of skinning (*d*); another larger and stronger pair for cutting tow; a large knitting needle inserted into a handle and sharpened at the end, for perforating the tarsi of birds pre-

*The following are the general measurements which should be taken of a quadruped.

Total length; nose to occiput; nose to eye; nose to ear; nose to end of tail; length and width of ears; tail from root to end of vertebræ; tail from root to end of hairs; length of the different joints of the fore-legs; length of the different joints of the hind legs; forefeet from wrist; hind feet from heel; length of toes; length of nails.

vious to the insertion of the wires (*i*); a tin sieve with a cover for dusting powdered arsenic upon the skin (*g*); a wide-mouthed jar, with a brush passing through the stopper, for holding arsenical soap (*f*); tow for stuffing small birds and mammals (the finest quality being used for filling the necks); also hay, dried moss, etc., for those of larger size; needles for sewing up incisions; thread for winding; a large fish-hook with the



barb filed off, for suspending specimens while skinning them. Annealed iron wire of various sizes, varying from 10 to 26,—No. 10 being used for supporting large specimens, No. 26 for humming birds, warblers, etc. A flat file of medium coarseness for pointing wire; a set of Aiken's tools, containing various sizes of brad-awls; a small gouge, chisels, etc., will be found very useful.

Method of skinning a mammal.—When an animal is ready for skinning, the mouth, nostrils and shot holes, should be filled with cotton or tow. Place the animal upon its back, take the scalpel in the right hand and with the left separate the hair to the right and left in a line from the the front of the pubis quite down to the vent, so that the skin beneath can be plainly seen. Make a longitudinal incision along the course, directed in as straight a line as possible, taking care not to cut so deep as to expose the intestines. The skin should then be turned back on either side with the aid of the scalpel, working downward toward the back. When the thigh has been laid bare sever it from the pelvis at its junction with the femur or thigh bone. Layers of cotton or tow should,

from time to time, be placed between the skin and body, as it will prevent the hair from being soiled. This operation should be repeated with the other side. Next the intestinal canal should be cut off a little way above the anus, and the tail separated close to the body. The skin should then be loosened from the back and breast until the fore-legs are visible. Sever these at the shoulder joint or the base of the humerus. Remove the skin from the neck and the back part of the skull will appear. In skinning over the skull, care should be taken to sever the ears as close to it as possible; also not to injure the eyelids or cut too close to the lips. The carcass should next be separated from the skull at the first vertebræ, or the junction of the skull and neck. The next operation is to remove the tongue, eyes, and all the muscles attached to the head. Through an opening in the occipital bone, carefully clean out the brain. Next the legs should be skinned quite down to the claws of the feet, removing all muscles, but leaving the ligaments and tendons of the knees. The hind legs should undergo the same operation. Lastly, skin the tail as far back as the first three joints of the vertebræ, and to this stump fix a stout cord, which should be fastened to a hook or other projecting object on the wall. A strong piece of wood is then prepared, flat, and sharpened upon both edges. This should be introduced between the skin and the vertebræ, and by working it around the latter, the attachments will be severed and the vertebræ within can be easily pulled from the enveloping skin. In skinning the tail of the beaver an incision should be made upon the under side, running lengthwise from the base to the tip. The skin should then be loosened, beginning upon either side of the incision, until the flesh is entirely free, when it can be removed, the arsenic added, the skin restored to position, and the incision sewed up.

The foregoing method is practised only upon the smaller quadrupeds; with the larger mammalia a different course is pursued. An incision is made from beneath the under jaw, in a straight line to the anus; transverse cuts are also made, running down the inside of both fore and hind legs. These being made upon the inner side will render the seams less conspicuous after the specimen has been mounted. To detach the hoofs, place them upon a stone and strike them repeatedly with a mallet; they will soon loosen and can be separated from the bone. After the operation of skinning has been completed, every part of the skin should be anointed thoroughly with arsenical soap. Turpentine applied to the nostril and lips will prevent the approach of noxious insects. When the skin is too large for the application of the soap, it should be thoroughly saturated

with a solution of "alum and water." The different bones left in the skin should all be thoroughly anointed with the preservative, and the eye-sockets and cavity of the brain filled with cotton or cut tow before replacing the skull in its natural position. If the animal be not too large the carcass should be preserved, as it will greatly aid the operator in his work of modelling a body. If immersed in alcohol, it can be kept any length of time.

To mount the skin; for instance that of a squirrel.—First provide yourself with tow, cotton, thread and twine; also, the stuffing forceps, a pair of pincers, file and wire cutters. With the aid of the forceps supply the various muscles of the face and head, by inserting cotton both through the mouth and eyelids. Take annealed wire of the proper size, and cut from the coil six pieces: No. 1, two or three inches longer than the total length of the body; Nos. 2 and 3 for the fore-legs; Nos. 4 and 5 for the hind legs; each of these should be two, or even three inches longer than the limbs they are to support; No. 6, for a support to the tail, of the same proportionate length as the others. With a large pair of scissors, cut fine a quantity of tow, and with this, and the aid of the long forceps, stuff the neck to its natural dimensions. Taking wire No. 1, bend in it four small rings, the distance between the two outer representing the length of the body taken from the skin, leaving one long end for a support to the head and neck. Mould tow about that part containing the rings, and by winding it down with thread, form an artificial body, resembling in form and size the natural one taken from the skin. Sharpen the projecting end to a fine point with the file, and insert it up through the cut tow in the neck, and thence through the skull; the skin should then be pulled over the body. Wires Nos. 2 and 3 should then be placed in position, by inserting them through the soles of the feet, up within the skin of the leg, and through the body of tow, until they appear upon the opposite side. With the pincers bend over the end of each, forming a hook; the wires must then be pulled backwards, thus fastening the hooks firmly into the body. The loose skin of the limbs should then be stuffed with cut tow, taking care to imitate the muscles of the living subject. Nos. 4 and 5 can be fixed in position after the same manner, except if the animal is to rest entirely upon its tarsi (as in the case with the squirrel when feeding), then the wire must be inserted at the tarsal joint instead of the sole of the foot. If any depressions appear in the skin they must be stuffed out with the cut tow. Wire No. 6 should now be inserted at the tip of the tail, and forced down within the skin, hooking it into the

body in the same manner as the leg wires. Stuff the tail to its proper dimensions, with cut tow, and carefully sew up the incision along the abdomen. Having prepared a board about three-quarters of an inch thick, pierce in it two holes at a proper distance apart for the reception of the leg wires (four holes would be needed if the animal were to stand upon all extremities); these must be drawn through upon the under side until the feet of the specimen rest close upon the upper surface, then they should be clinched, taking care that the wire does not protrude above the surface of the board as it renders the support unsteady. The different joints of the limbs can now be imitated by bending the wire at the proper points; also, a curve can be given to the back, and the tail can be set into proper position by simply bending the wires into the required shape. The eyes should now be placed in their position, a little putty having been previously inserted within the eyelid to serve as a cement. Care should be taken in arranging the eyelid, for the expression depends altogether upon this point. Clip off any superflous wire which may extend above the head with the wire cutters. The specimen should then be placed in some locality free from moisture and allowed to dry thoroughly, when it is complete for the cabinet.

In mounting quadrupeds of large size the following formula should be pursued: — Procure a bar of wood, an inch thick and two inches broad, of a length equal to the distance between the shoulders and thighs; this should be placed within the skin, three holes having been previously made at one end, and two in the other, with a gimlet, for the reception of the various wires. This is used as a substitute for the central wire or body support. Having sharpened a piece of wire large enough to support the specimen firmly, force it down through the skull and neck, passing it through the gimlet hole; when it appears on the under side bend the end into the form of a hook with the pincers, and drive it firmly into the wood. Next the fore-leg wires, well sharpened, should be forced up through the soles of the feet, and fixed into the bar of wood, in the same manner as the head support. Do the same with the hind leg wires, fastening them at the lower part of the bar. Lastly, the tail support should be placed in position, fastening it to the wooden bar. This completes the framework. A quantity of hay or moss should now be procured, and it is of the utmost importance that it should be thoroughly dry, otherwise the specimen is liable to mould. Commence filling the neck, keeping the wire in the centre of the material, and stuff downward to the fore-legs; these should then be restored to form, taking care to imitate the muscles of the shoulder. In working

down the body place the hay or moss between the bar of wood and the skin to avoid all stiff appearances; always place the stuffing material evenly within the skin, and never use pressure, as a fresh skin can be easily expanded far beyond its natural dimensions. Having reached the hind legs, imitate faithfully, by stuffing, all the natural muscles. When this part has been completed, sew up the various incisions; attention should be paid to separating the hairs, and not to take any of them in along with the thread. Imitate the joints of the limbs by bending the wire at the proper points, and place the specimen upon the board, draw the wires through the holes with the pincers, and clinch them upon the under side. The specimen will then assume an erect position. The orifices of the eyes, mouth and ears, should be filled with cotton saturated with the preservative, and the artificial eyes put in while the eyelids are yet pliable. The lips can be secured in their proper position by means of pins, and the nostrils distended to their natural size, with pellets of cotton inserted within. In the larger mammalia the orifices of the head should always be anointed with *spirits of turpentine.* If any irregularities appear in the skin, they must be pressed down and modelled into shape with the hand. The muscles of the various parts of the body can be exactly imitated by making casts of plaster of Paris, and fitting them within the skin in lieu of other stuffing material. [*To be continued.*]

THE FRESH-WATER AQUARIUM.

The art of preserving water animals alive and in good condition, as pets or as objects of study, is not of recent date; but the principles of what is now commonly known as the aquarium, were not until lately brought into general notice. The Romans had their tanks of game fish, the English and French gardeners their vessels for the growth of tender water-lilies or other valuable aquatic plants, yet the happy thought of uniting the two,—fishes and plants,—so that the one should balance the other, each aiding in the others support, making withal a collection of such proportions as to be conveniently kept indoors, is the production of comparatively late years.

Dr. Johnstone, of Liverpool, has the reputation of having been the first to apply practically the principles of the aquarium; he made experi-

ments with the *Corallina officinalis*, Starfish, *Confervæ*, and some small plants of the *Ulva latissima*, and found that they flourished for eight weeks without being disturbed; this led him to try some fresh-water fishes and larvæ, and they succeeded even better than the salt-water specimens. Since then Gosse, Hibberd, Warington and others of England, and the late Mr. Cotting, of Boston, have done much towards forwarding the interests of the aquarium. The whole secret of the success of the aquarium lies in the exactness with which we imitate nature in arranging and disposing our collections; but let us understand first of all what is meant by the term. An aquarium is a collection of water plants and animals, so arranged in suitable ratio that it shall be perfectly self-supporting. We do not expect, then, that the water will have to be changed until after long periods, if at all; the plants and animals should flourish as well as if in their native locality.

How then is this balance of forces to be attained? This leads us to examine the philosophy of the aquarium, which is simply this: The element in water on which the fishes live by breathing is free oxygen, which, as the water is fanned through the gills or lungs of the fish, comes in contact with the walls of its vessels, and arterializes the blood; all water contains a certain amount of this oxygen, sufficient to keep a fish alive for a short time, but if no means are taken to create a fresh supply, it will become exhausted sooner or later, and an escape of carbonic acid will render the water poisonous to the fish. In plants, on the other hand, we have an agent taking up the carbonic acid in the water, and resolving it into carbon and oxygen, the former of which it converts into its substance, while it expels the latter from every part of its tissue, especially from the leaves in the form of minute bubbles, plainly seen in healthy plants, and so often compared to drops of quicksilver in appearance. It is true that plants absorb oxygen also as fishes do, but they give out so much more than they absorb, that this is of slight account.

Another oxygen-producing agent, as was shown by Liebig, is to be found in the almost microscopic forms of animal life which abound in water which has stood for sometime exposed to the air. These animalculæ seem to form another link in the chain which binds together all kinds of animal life of higher or lower order, however apparently diverse they may be. This extra supply of oxygen adds greatly to the support of the aquarium, and is no doubt the reason why a large number of fishes can be supported with a seemingly small proportion of plants. It would indeed be an interesting experiment to try, were we to place a small fish in a

large tank, and see if, from the oxygen of these infusorial animalculæ alone, life could be sustained.

It must be the aim of him who wishes to establish an aquarium to see that this balance of plants and fishes is effected, for it is indispensable. Starting then with some idea of what we wish to accomplish, the first inquiry is about the kind of tank we are to use. This is an affair of more than mere fancy, convenience, or economy, for it is important for the growth of many plants that they should have the greatest amount of light possible, and this is especially true with fresh-water plants; so that where a wash-bowl or a tub would make an excellent tank for a salt-water collection, the same might fail of success in one with fresh-water. Besides, there are many specimens which we wish to examine sidewise, and obtain that view which is not possible to have in nature, namely, that of a vertical section of a pond. The requirements of a good vessel or tank for an aquarial collection are strength and sufficient transparency; these we have in a moderate degree in the inverted bell-glasses, or cake covers, of confectioners. If, however, the glass becomes cracked and broken from any cause, and it is surprising how easily it is broken, the whole collection of specimens is in great danger of being lost, especially if the accident happens in the night-time. Another disadvantage which the cake covers have is, that through them the specimens are sometimes magnified, and irregularly too, so that what has been put into the tank as a very small and finely shaped fish, in an instant becomes a giant more or less deformed. This kind of tank is the usual one adopted by those who are making an aquarial collection for the first time, and it answers many purposes admirably; it is sufficiently transparent, moderately strong, and quite cheap. One having a diameter of twelve and a half inches, with a depth of eight inches, and of good thickness, can be bought for two dollars and a half; the knob on the top will prevent it standing steadily, and to obviate this difficulty a stand can easily be turned from a block of wood, with a hole cut in the centre large enough to admit the knob, and allow the bottom of the glass to rest upon it as a support. If properly taken care of, a tank of this sort will last for years, and be a great comfort to its possessor, but an untimely accident will before long induce him to try something more substantial.

Perhaps the best tank for the aquarium in use is what is called a rectangular tank, having the four sides of glass, and the base of some hard material such as stone, iron or wood. The glass is held in place, and supported at the four corners by as many pillars of iron or wood, which

are held together on top by strips of a similar material connecting them. Of the three materials for the base and pillars, iron is by far the best for a fresh-water tank, if we can have but one material alone; it is lighter than stone, and the little it rusts from time to time does not amount to anything; the water does not ooze through it as it does through some kinds of stone, and it does not warp, as wood is apt to do if the tank is left without water for a length of time. To prevent rusting a layer of cement may be spread on the bottom of the tank inside, and a plate of thick strong glass placed upon it; and in the same way a narrow strip of glass can be cemented to each of the pillars, so that the iron shall be prevented from coming in contact with the water at every point. A tank, having a base of slate and pillars of iron protected by glass, as just explained, is the best kind of a tank to own, as it can be used for either salt or fresh water as we require. The shape of a tank, too, is of some importance, that of a double cube being the best for this reason, that it allows more of a clear surface on the long sides for inspection after the rockwork and plants are introduced, than a tank whose shape is square; it also gives a better chance for the light to strike upon every point inside.

The facilities for procuring tanks already made are so great nowadays, that while once it was an object to know how to construct a tank for one's self, now one has only to make a choice from several patterns. The most important thing to look after in selecting a tank, next to its material and shape, is the kind of cement which has been used; all sorts of putty are to be rejected as worthless; if we cannot be sure that the cement is good and not injurious to fishes, a few weeks trial, or even less, will convince us of its value. Another point to be attended to, is that the cement be quite hard before the tank is filled with water, as there are some kinds of cement used that never harden; of course, in these cases there is danger of having a leaky tank with which to contend

Of the other kinds of tanks, either those made wholly of clay, or of glass, or those with one side at an angle of 50° with the base, so as to form a beach, after the pattern of the Warington tank, or those with all the sides of slate, in imitation of a rock pool, or those of an oval or hexagonal shape, each has its advocates. Some tanks have been lately made in New York, with the base and pillars of a composition which is silver-plated; they are wonderfully light and beautiful, but there seems to be doubts as to their durability. More or less ornament can be displayed on the pillars and base of the tank, according to the taste of the owner, but it seems as if simplicity and neatness were fully as requisite here as else-

where, and that the ornament of the tank should be the collection inside. As to the size of the tank, it very much depends on the place in which one has to put it. These three sizes I have found from experience very useful:

No. 1, Length, 18 in.; depth, 10½ in; width, 12 in.

No. 2, Length, 24 in.; depth, 14 in.; width, 14½ in.

No. 3, Length, 28 in.: depth, 13½ in.; width, 13 in.

No. 3 is, perhaps, the best size of all, and it is by far the prettiest shape. Tanks can be purchased, generally, at the bird or plant stores of large cities; the prices range from six dollars upwards. Sometimes a stand for the tank is made in connection with it, or of a similar material. It is well to remember in selecting a stand, the enormous weight which it will have to bear when the tank is filled with stones and water. — *To be continued.*

ANNOUNCEMENTS.

WE take pleasure in announcing the MANUAL OF ZOÖLOGY, by Prof. A. S. Packard, of Brown University.—At various times there have appeared from American authors, Text-books on Zoölogy, some of which have filled their places in the literature of science, while others have been noteworthy only from their errors and misstatements. Eaton's "Zoölogical Text-book" (Albany, 1826,) was, we believe, the first American book embracing the whole animal kingdom; since then, Ruschenberger, Agassiz and Gould, Hooker, Tenney, Morse, Orton and Steele have written text-books on this subject; and now appears this new work which seems to us a model in its way.

Professor Packard's work is intended for use in colleges, and is admirably adapted for that purpose. It gives a clear, concise account of the Animal Kingdom, from Protozoa to Man, giving the anatomy and embryology of the various groups, and omitting (a feature which pleases us) much of the systematic work which has been a prominent feature in all other American books. It combines the advantages of laboratory work with that of the class-room, while, at the same time, it leaves nothing to be asked by the general student. The plan is briefly this: a detailed account of the anatomy of some easily obtained form is given with illustrative figures, and this is made a *type* by which all allied forms are compared, and their resemblances and differences pointed out. The work, in every way, represents the present state of zoölogical science, and should be in the hands of every lover of nature. The author's reputation as an authority on zoölogical subject is, we think, recommendation enough for the work.

A New and Valuable Work on Archæology.—We can furnish copies of the Memoir of the University of Tokio, Japan, "Shell Mounds of Omori," by Prof. E. S. Morse. This book consists of 1 quarto vol. of 37 pages of text, and 18 double-paged plates containing over 300 figures of the pottery of that interesting country, printed by lithography, *and very finely executed.* Prof. Morse has just returned from Tokio, and has written the work from his own observations. Persons interested in archæology will find this book a valuable adjunct. The American Naturalist, after giving a synopsis of the character and contents of the work, concludes by saying:—"In conclusion, we consider Prof. Morse's Memoir one of the most important contributions to archæology for the year 1879.

MR. JOHN ROBINSON, author of "Ferns in their Homes and Ours," has in manuscript, shortly to be published by the Essex Institute of Salem, Mass., quite an extensive paper entitled "The Flora of Essex Co., Mass." It consists of an enumeration of the Flowering Plants, Ferns, Mosses, Lichens, Chara, Seaweeds, etc., growing in the vicinity, and those other

introduced plants which have become well established. It promises to be an important addition to the botanical literature of the County.

WE take pleasure in announcing the "New American Monthly Microscopical Journal," which, as its prospectus states, is a continuation of the Quarterly. We need a magazine devoted to Microscopical Science in this country, and we think every Microscopist should feel himself called upon to take a personal interest in an enterprise, which is to prove of so much benefit to them. The scope of the Monthly, as given in the prospectus, covers the ground thoroughly and, we think, leaves little to be desired.

THE forthcoming volume of the Proceedings of the American Association for the Advancement of Science contains a number of valuable papers, among which may be mentioned,—History and Methods of Palæontological Discovery by Prof. O. C. Marsh. The author gives in a clear, concise manner, the history of the science from its conception, dividing the subject into four periods; from the crude impressions of the ancients to the learned reasonings of the modern scientist. A very valuable contribution.

OBSERVATIONS of the Transit of Mercury, May 6, 1878, including a Systematic Search for a Satellite, and Measures of the Diameter of the Planet. By D. P. TODD, Washington, D. C.

A PAPER on the Observations of Double Stars. By ASAPH HALL, Washington, D. C.

THE Twelfth Annual Report of the Peabody Museum of Archæology and Ethnology, Cambridge, 1879, presents some important articles on archæology and kindred subjects, and promises, we think, to be quite an attractive volume.

AD. F. BANDELIER writes a very exhaustive paper on the Social Organization and Mode of Government of the Ancient Mexicans. The author gives copious notes and quotations from distinguished authorities, making the contribution a most important work of reference.

PAUL SCHOMACHER invites our attention to the Method of Manufacturing Pottery and Baskets among the Indians of Southern California.

ELMER R. REYNOLDS contributes a paper on Aboriginal Soapstone Quarries of the District of Columbia.

HON. LEWIS H. MORGAN is the author of an article entitled "The Ruins of a Stone Pueblo on the Animas River in New Mexico."

NOTES AND QUERIES.

GEORGE CUVIER (born 1769 died 1832) was the founder of Comparative Anatomy. He proposed a new method of Zoölogical classification, which is substantially the one in use to-day, based on plan of structure. The first volume of his Comparative Anatomy appeared in 1800, and was completed in five volumes in 1805. His great work "Le Règne Animal" in four volumes appeared in 1817, and with its two subsequent editions was the foundation of modern zoölogy. His work on vertebrate fossils, "Recherches sur Ossemens Fossiles" in four volumes 1812-13, was one of the classics of scientific literature. Previous to Cuvier, the only general catalogue of animals was contained in Linnæus' "Systema Naturæ."

THE Theory of Evolution was proposed by Lamarck during the days of Cuvier who was a bitter opponent of the doctrine.

DARWIN'S great work, "Origin of Species," appeared in 1859, and was the pioneer work in the literature of modern evolution.

In early days fossils were classed with minerals. Cuvier was the first to recognize their alliance to living forms, and thus the first to bring them within the domain of organic nature.

LINNÆUS, the great Swedish botanist, was born in 1707 and died in 1778. He was the founder of the modern system of nomenclature in Natural History.

I. J. P.—LOUIS AGASSIZ was born in 1807 and died in 1873. His great work was "Recherches sur les Poissons Fossiles." He was a pupil of Cuvier.

DURING a short stay in Thorndike, Maine, the writer, among other objects of interest, found the following, which to him seemed uncommonly large specimens: Botrychium Virginicum 29 inches high, and 16 inches broad; Aspidium cristatum 29½inches high; Aspidium acrostichoides 29 inches high; Phegopteris polypodioides 24 inches high; Struthiopteris Germanica 5 feet high. The last named fern grows in great abundance and beauty, in fact, the whole region is prolific in ferns, many varieties which are rare in this locality (Salem, Mass.) abounding in great profusion. Phegopteris dryopteris and Adiantum pedatum might be added to the above list.—S. F. C.

WE have quite a variety of ferns which we can exchange. We desire especially Western species. Should be pleased to open correspondence with persons desiring to dispose of such material.

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In order to facilitate the purchase of books on Natural History, and to aid in every possible way the growing taste in science, we have established here in the old historic town of Salem, the *Naturalists' Bureau*, for the purpose of bringing together, as it were, the specialist and author, the distant collector and home student. We shall keep for sale works on Natural History, Specimens, Materials, etc., needed by Naturalists in every department. It will be our aim so to conduct our business as to inspire confidence among our patrons, not only by promptness and accuracy, but also by close attention to minor details; making, in every case, the interest of our customer our first consideration.

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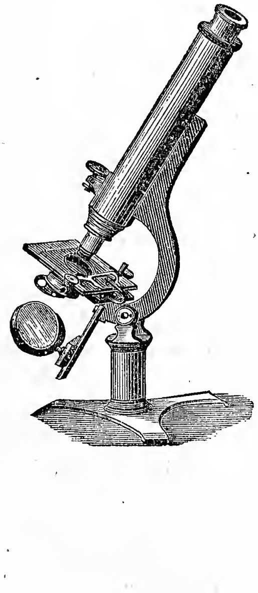

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THE LARGEST MOUND IN THE UNITED STATES.

By F. W. Putnam,

Curator of the Peabody Museum of Archæology and Ethnology, Cambridge.

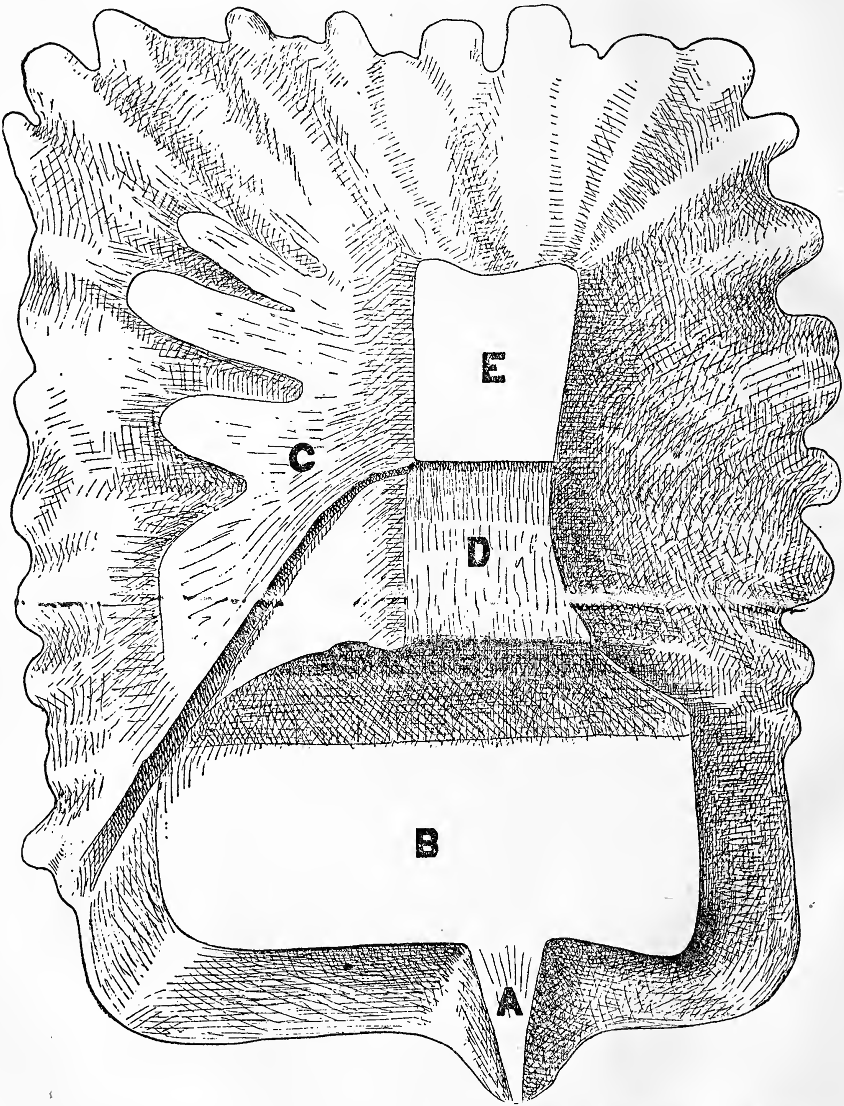
In company with several gentlemen from St. Louis and with Dr. Patrick of Bellville, I had the good fortune, in September, 1878, to visit the great Cahokia Mound, the largest tumulus within the limits of the United States. This immense work of the Southwestern Moundbuilders is near Cahokia creek in Illinois, on the "Great American Bottom," and nearly opposite St. Louis.

Situated in the midst of a group of about sixty other mounds, of more than ordinary size, several in the vicinity being from 30 to 60 feet in height, and of various forms, Cahokia Mound, rising by four platforms, or terraces, to a height of about one hundred feet, and covering an area of over twelve acres, holds a relation to the other tumuli of the Mississippi Valley similar to that of the Great Pyramid of Egypt to the other monuments of the Valley of the Nile.

Although this mound has been described or alluded to by many writers, there exists considerable confusion in regard to its name,

size, and exact location, and Col. Foster, in his "Pre-historic races of the United States" (p. 107), actually regrets that "it

Fig. 1.

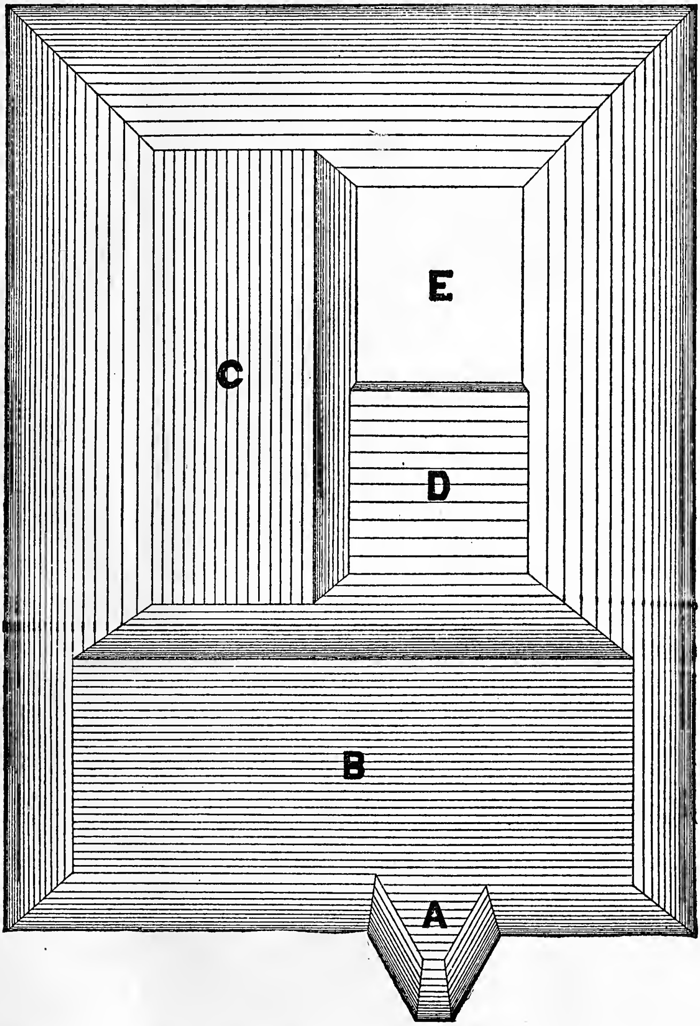


Plan of Cahokia Mound in 1878. From model by Dr. Patrick. Scale 200 feet to an inch.

has been swept away by the levelling influence of modern improvement.

By several writers, the name of "Monks' Mound" has been bestowed upon this tumulus, under the belief that the settlement

FIG. 2.

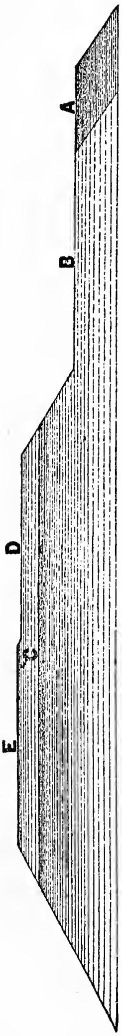


Plan of Cahokia Mound. Restoration. From model made by Dr. Patrick. Scale 200 feet to one inch. A, B, the lowest platform; C, the second platform; D, the third; E, the fourth and highest.

of the order of La Trappe was upon its summit. The statements of Brackenridge, who visited the place in 1811, while the Trappists

still had their settlement, show, however, that the mound upon which the Monks were located was the smaller structure, of a similar shape, situated a short distance to the westward of the "great mound," and that the apron of Cahokia Mound was used as a vegetable garden and its summit was then planted with wheat. While there is not the slightest evidence that the *Cahokias* of the time of La Salle were the builders of this, or of other mounds in the vicinity, it is a gratification to be able to perpetuate the name of an extinct tribe of American Indians in connection with this monument of an unknown American Nation, rather than that of a religious order of foreign origin.

Fig. 3.



Cahokia Mound. Elevation from the west. Scale 200 feet to one inch.

Fig. 1 represents the mound as it now appears, with its once level platform and even slopes gullied, washed, and worn away; and Fig. 2 is in the form of a restoration, showing the mound as it probably existed before the plough of the white man had destroyed its even sides and hard platforms, and thus given nature a foothold for her destructive agencies. I have also in Fig. 3 shown the elevation of the mound from the west as represented in Fig. 2. The projecting portion (A) from the apron (B) points nearly due south.

Probably this immense tumulus was not erected primarily as a burial mound, though such may prove to be the case. From the present evidence it seems more likely that it was made in order to obtain an elevated site for some particular purpose; presumably an important public building. One fact, however, which I observed, indicated that a great length of time was occupied in its construction, and that its several level platforms may have been the sites of many lodges, which, possibly, may have been placed upon such artificial elevations in order to avoid the malaria of a district, the settlement of which in former, as in recent times, was likely due to the prolific and easily cultivated soil; or, more likely, for the purpose of protection from enemies. The fact to which I allude,

is that everywhere in the gullies, and over the broken surface of the mound, mixed with the earth of which it is composed, are quantities of broken vessels of clay, flint chips, arrowheads, charcoal, bones of animals, etc., apparently the refuse of a numerous people; of course it is possible that these remains, so unlike the homogeneous structure of an ordinary mound, may be the simple refuse of numerous feasts that may have taken place on the mound at various times during its construction. The first interpretation, however, is as well borne out as any other from our present knowledge of this mound; the structure and object of which cannot be fully understood until a thorough examination is made and while such an examination is desirable, it is to be hoped that this important and imposing monument will never meet the fate which Col. Foster, under a false impression* due to a confusion of names and places, mourns as having already occurred.

HINTS ON TAXIDERMY.

(*Continued from page* 9.)

The method of collecting, preserving and mounting birds. The first specimen procured, however imperfect, should always be preserved until a better one can be obtained. As soon as a bird has been killed, the following directions should be carefully observed. Fill the mouth, throat, nostrils and vent with cotton; also any shot holes which may be discovered. If there is any fresh blood upon the feathers, sprinkle the spots with dust, sand, powdered chalk or any other similar substances. These precautions being observed, all stains caused by blood or internal secretions will be prevented.

A paper tunnel should now be made in the same manner as those used by grocers, the bird placed in it with the head towards the point, and the upper part folded over and fixed in this position by means of a pin, taking care not to injure the tail feathers by

*The destruction of "Big Mound" on the opposite side of the river, within the city limits of St. Louis, probably led Col. Foster into error.

bending or displacing them. The parcel should then be placed in a box, sufficiently large to accommodate it without crowding, and the remaining space filled with grass, paper or any substance more easily obtained; this will prevent the specimen from being injured by friction. In our own portion of the country during the colder seasons, also in the more northern latitudes, a bird may be allowed to remain (in extreme cases) forty-eight hours before the operation of skinning is undertaken, but half the time is a safer rule. In the summer season it may be permitted to lie until the blood has coagulated and the limbs have stiffend; but in all tropical countries the operation cannot be effected with too great dispatch. If the specimen is allowed to remain any length of time beyond that above stated, the feathers about the head and abdomen are apt to fall off, thus rendering it more difficult to remove the skin; and the specimen often becomes unfit for preservation. Before skinning a bird, particular attention should be given to the color of the eyes, bill and legs, because these parts are liable to lose their tints after life is extinct, and the color of the feathers upon the various parts of the body. Measurements should also be taken after the following manner, in feet, inches and fractions of an inch:—

Total length from the tip of the bill to the end of the tail, the neck being stretched out in a straight line; length of the primary quills of the wing; total length of the bill, measuring either from the feathers on the forehead, following the curve of the ridge down to the tip, or from the angle of the mouth in a straight line to the tip; the length of the tail feathers from the extremity to their insertion in the coccyx, together with their number; the length of the tarsus, from the centre of the metatarsal and tarsal joints; length of toes; length and general character of the nails; the distance between the tips of the wings when spread out to their full extent. It should be next observed whether it be male or female, young or adult; also, any change of plumage in winter or summer; the common name given it in the locality where it was collected; the exact date when it was killed, and every fact which can be ascertained concerning its habits. "The sex of the specimen may be ascertained after the operation of skinning has been completed, by making an incision in the back, near the vertebræ, and exposing the inner surface of the 'small of the back.' The generative organs will be found tightly bound to this region

(nearly opposite to the last ribs) and separating it from the intestines. The testicles of the male are two spheroidal or ellipsoidal whitish bodies, varying fron the size of a pin head to that of a hazel-nut, according to the season. The ovaries of the female, consisting of a flattened mass of spheres, variable in size with the season, will be found in the same region."* All of the above statements should be plainly written upon slips of parchment or pasteboard, with ink, and attached to the corresponding specimen, or recorded in a blank book, with a number corresponding to the one attached to the specimen.

When practicable, nest and eggs should be preserved with the birds to which they belong, and all information concerning dates and places where they were found. drawings of specimens will also be useful, both in mounting and as a source of reference. Many may consider the above directions, or at least a greater portion of them, of not much importance, but if they are carefully observed and practiced, the value of the collection will be greatly enhanced, since such imformation is of the utmost importance in scientific reseaches. Even should they not be destined for these purposes, the ameteur will find his collection far more interesting and instructive.

The collector should be provided with a light double-barrelled gun, the best of powder, and shot of various sizes, No. 10 being used for killing small birds, as it is least injurious to the plumage. Humming Birds should be killed with dust shot. Early in the morning and after sunset are the best periods of the day for procuring birds. If the collector be in any tropical country, he should choose the early dawn for his excursions, on account of the coolness of the air. It is also the time when the birds are seen and heard in greatest numbers. Birds in tropical countries are generally so tame, that they can be easily approached; and with little skill a sufficient number can be killed in the space of two or three hours, to occupy the collector the remainder of the day. It is a good rule *never to kill more specimens than can be preserved during the day.* In some parts of tropical America, Humming Birds, Creepers and other small birds are shot with blowpipes by the natives, and they are killed in this manner without the least injury to their plumage. Many are also caught by means

*Report of the Smithsonian Institution.

of birdlime and in springes, and specimens secured by these means are best for preservation.

The method of skinning a bird.—One of the most important points of taxidermy, is a correct knowledge of the method of skinning a bird, so that when the operation is finished, the skin may be as perfect as possible and free from all stains. It is impossible for any one to mount a specimen neatly and artistically, from a soiled or mutilated skin. There are many instances, however, in which it may be necessary to mount poor skins from their rarity; these should never be rejected, for a specimen badly stuffed is better than none at all, and will answer until a more perfect one can be obtained. There are two things essential to success, viz., patience and practice; and a good store of both will enable one to preform the operation with ease and dispatch. Care should always be taken not to stretch the skin, in order that its natural dimensions may be preserved.

Before proceeding to work, provide yourself with a cup of Indian-meal, cotton, needle and thread, scalpel and preservative. In the first place examine the bird, and if any spots of blood be discovered, sprinkle them with Indian-meal, and rub it back and forth with the fingers, supplying fresh meal from time to time; this will remove it entirely. If the blood be dry, apply a little warm water with a sponge, and wash the spot gently. In this manner I have cleaned the entire breast af a bird stained with blood. If any of the feathers are bent, they may be restored to position by immersing them in warm water. Remove the cotton from the mouth, nostrils and vent, and replace it with fresh stuffing. A piece of small but strong twine should now be passed from one nostril through the other on the opposite side, and bringing the ends downward tie them beneath the lower mandible, leaving them a little longer than the neck of the bird. This will aid the operator in turning the head back to its natural position after the operation of skinning has been finished. Now take an accurate measurement from the tip of the bill to the end of the tail; also the girth of the body behind the wings. The bird is then ready for the operation. Placing it upon its back with the tail turned towards your right hand, with the left separate the feathers from the lower extremity of the breastbone, quite down to the vent, laying them to the right and left so that the skin beneath is visible. Place the scalpel upon the lower tip of the

breastbone and cut the skin from this point in a straight line to the vent, taking care not to sever the thin muscular tissue which covers the intestines; should this have become accidentally cut, thereby exposing the intestines, remove them at once, that they may not soil the feathers. The skin must now be separated from the flesh on either side of the incision by passing the flat portion of the scalpel handle between the skin and the body. It will be found that some birds have the skin bound much closer to the flesh than others by means of small ligaments; these must be severed with the scalpel. When the skin is loosened from its attachments quite down to the back, and the thigh laid bare, the latter should then be pressed inward and the skin turned back, in order that the leg may be separated from the body at the second joint, or the junction of the tibia with the fibula. Repeat the operation with the other side. Next, the rumpt, or that part into which the tail feathers are fixed, should be severed from the body at the junction of the last dorsal vertebra with the coccyx, taking care not to cut the skin upon the back. Should blood at any time be discovered, absorb it with Indian-meal, and the oily matter proceeding from the fat (which is to be especially avoided in all the marine species) may be absorbed with a little powdered chalk. If the bird is a large one, it may be now suspended by means of a fish-hook with the barb filed off, and attach to a strong cord, which will aid greatly in removing the remaining part of the skin; but if it is a small one, it should be placed upright upon its breast, with the head lying backward. In this position the skin should be removed from the back and breast, by using the handle of the scalpel as stated before, until the wings are reached upon both sides. These are to be severed from the body at the shoulder-joint. It will be found to be much easier to unjoint them by cutting beneath instead of above the joint. The neck having been reached, must be turned out until the back part of the skull is laid bare. Having separated the cervical vertebræ, or the vertebræ of the neck, close to the head, remove the ear by separating the thin skin by which it is bound to the ear-socket, being cautious not to injure it by tearing or cutting. By close examination it will be seen that the eyelid is bound to the edge of the socket by a thin skin; this should be completely severed, thereby freeing the lid from its attachments. The eyes may then be removed by passing the blade of the scalpel beneath the ball and severing the optic nerve,

endeavoring not to burst the former, as the humors contained within would then ooze out, and flowing through the eyelids, soil the feathers upon the head. Next cut away the tongue, together with the flesh beneath the mandibles and upon the various parts of the head, and through an opening made in the lower part of the skull carefully remove the brain. It is well to remark here that the heads of some birds are so large in comparison with the neck, as to render it impossible for the head to be turned out in the ordinary way without stretching the skin. In this case the vertebræ of the neck should be separated close to the skull, the body taken out and laid aside and the head pulled back into its natural position. An incision is then made through the skin upon the back of the head, large enough to permit the passage of the skull, and this should then be cleaned in the same manner as stated above. Ducks, woodpeckers, flamingoes, macaws, etc., come under this rule. After the presevative has been applied to every part, and the cavities of the brain and eye filled with cotton, restore it to position, being careful to sew up the incision neatly. The wings should next be turned out, exposing two joints. The humerus may then be removed, but the double bone, consisting of the radius and the ulna, should be carefully cleaned and allowed to remain. Many taxidermists prefer to have all the bones left in their places. This, I think, should be a rule in preparing dried skins, as the wings retain their position better; but when a skin is to be mounted at once, I remove the humerus, and then find it much easier to set them. It is also a practice with many, in lieu of turning the wings, to make a longitudinal incision beneath the wing, running the length of the first joints, and through this to remove the flesh. Lastly, the legs should be skinned, removing all the flesh, and leaving in the fibula or thigh bone. If the skin is to be mounted at once, annoint it thoroughly with powdered arsenic applied with the sifter; but if not, use the arsenical soap, because it can then be softened more readily when required for mounting. Fill the eye-sockets and cavity of the skull with cotton. Restore the leg and wing bones to position. To accomplish the latter, take hold of the tips of each, and pulling them from each other, they will easily slip into place. In turning the head back, take hold of the twine which is fastened to the bill, pulling it gently and steadily, working with the fingers when necessary, taking great care not to stretch or tear the skin of the

neck. Smooth the feathers upon the various parts of the skin, and the specimen is ready for mounting.

The method of mounting a bird.—Having furnished yourself with tow, cotton, needle and thread, annealed iron wire of a size proportionate to that of the bird to be mounted, and the necessary instruments, including a large and small forceps, file, pincers, wire cutters, scissors, etc., proceed to cut fine a quantity of tow sufficient to fill the neck. With the long forceps seize a small bunch of this and insert it up through the neck and deposit it under the bill: in this manner fill from beneath the lower mandible down to the breast taking care not to insert too much stuffing or to place it unevenly. Next cut three pieces of wire; one a third longer than the total length of the body, for the main support, the the other two or three inches longer than the united length of the *tarsus* and *fibula*, for the leg supports; also four smaller ones five inches in length, for setting the wings and winding purposes. Sharpen each of these with the file to a fine point. Take the longest piece and bend it in three small rings, the distance between the outer ones representing the length of the carcass of the bird, leaving one long and one short end, in the same manner as reccommended in stuffing small quadrupeds. Tow should be wound about the end containing the rings, and moulded into the natural form of the body. This being completed, place the longest projecting end within the skin at the base of the neck stuffing, and holding the head of the bird in the left hand, letting the skin hang down, with the right, insert it up through the cut tow within the neck, and thence through the top of the skull. Care must be taken not to push too hard, for by so doing you may displace the stuffing, but rather twirl the wire between the thumb and forefinger, when it will be found to penetrate easily. The skin must then be drawn over the artificial body, and the leg wires placed in position. The latter is done by placing the pointed end upon the sole the foot, and forcing it up through the tarsus, between the skin and the bone, until it has reached the first joint. The leg bones should then be turned out again, when the wire will appear. It should then be forced up a little above the top of the fibula, and cotton wound about both. This should be made to resemble the form of the flesh, which has been removed, and bound about with thread to prevent it from slipping. The whole may then be turned back into its proper place. Now hold the protruding point

against the side of the artificial body, about midway between the extremities, and force the wire through transversely, until it appears upon the opposite side, care being taken not to penetrate the skin. The end should be bent into the form of a hook, when, by taking hold of the protruding wire at the sole of the foot, and pulling it towards yourself, the hook will be fimly fastened into the body. The incision should now be closed up, by bringing the edges of the skin together, and making them fast in this position with common pins; with ducks and larger birds it is necessary to sew up the lips of the incision. The legs are next brought towards each other, bending the wires close to the body until they are parallel. The joint of the fibula and tarsus should also be imitated. All perching and climbing species should be mounted upon stands formed like the letter T; the waders, swimmers, and all other species which frequent land or water, ought to be placed upon flat pieces of board. The neck can now be bent into position, and the head directed either to the front or side, according to the taste of the operator. The wings are next raised up, and placed against the sides of the body, in the same position as when the bird was living, and fastened in place by means of the short wires forced through the shoulder into the body. The tail is supported by means of a wire inserted beneath the tail feathers and passed into the body.

In placing birds in certain positions, it is necessary to spread the tail feathers. This may be accomplished in a variety of ways. First, by running a small pointed wire through the shaft of every feather: this method, however, is not applicable to very small birds. Another is to take a piece of cardboard, somewhat longer than the width of the tail spread out to its full extent, and cut a horizontal slit in it of the required length; the feathers are inserted in the slit, and are retained in whatever position they have been placed. This method is practiced only upon small birds. A third method is to take a piece of wire of small size and bend it double, pressing the bent end firmly together with the pincers; the tail feathers are then arranged between the two, that is with one above and the other beneath them. The loose ends are then brought together and twisted to prevent them from springing apart; also to hold the feathers more firmly. The latter is applicable to birds of any size. The two remaining wires should next be inserted into the body, one upon the back just below the curve

of the neck, the other above the rump. These are used for convenience in winding, and can be removed after the specimen is dry. The feathers should be placed each in its proper place by means of the small forceps. If the eyes are not sufficiently plump a little cotton can be inserted through the eyelids, with a small quantity of putty, by which the glass eyes will be more firmly fixed; the latter operation should receive much care, the eye should have its natural fullness, and the eyelids should be well rounded. The bird should then be bound with thread, wound about the various protruding wires. This operation is done to keep the feathers in place until they are firmly fixed. A bird should not be allowed to *dry* too quickly, as the skin is then liable to shrink, but it should be placed in some *dry* place, not too warm, where the skin can gradually stiffen. When *dry* remove the thread, pull out the wires upon the back, and with the wire cutters, clip off the remainder close to the body. To insure success, the taxidermist should have a correct knowledge of the habits of birds, that he may place his subject in a position characteristic of the species. The measures previously taken will aid in securing accuracy of form.

Taxidermists, as a general thing, are apt to overstuff their specimens, and the beginner should strive to avoid this. There are several attitudes assumed by birds in the living state, which can be copied with advantage. To represent a bird in the flying position, its wings should be extended as far as possible, the tail placed horizontal and well expanded, the neck stretched forward and the legs drawn up close to the breast, with the toes closed. The wings may be spread by means of pointed wires inserted from the inside of the body, up through the wings beneath the skin, as far as the carpus, or fore arm. The wire can also be inserted from the outside near the joint of the carpus, and be forced down the wing between the skin and the bone, and thence transversely through the artificial body, into which it is fastened by means of a hook. These wires should be inserted before the leg wires are placed in position, and hooked into the artificial body, as in the former case. An interesting attitude is when a bird is about to take flight. In this position the body should incline forward, and the wings be slightly raised; this can be accomplished by means of external wires placed beneath them, which are allowed to remain until the bird is dry. The moment of alarm is a striking position. To express this, the one foot must be stretched forward and the other drawn

up near the body, and considerably bent. The body must be thrown to one side, and the wing on that side much elevated and spread out, while the other is placed lower and less diffused; the tail must be expanded, thrown down at the point, and much arched; the neck should be stretched upward, and the head inclined towards the foot, which is drawn up; the eyelid should also be well rounded. The eagle can be placed in the position of seizing its prey, with wings and tail expanded, head thrown backward and crest erect, gazing upward. The vulture should have drooping wings to portray its sluggish habits. Such descriptions are endless and indeed needless to a student of nature.

Remarks upon preparing, relaxing, and mounting dried skins.—The bird should be skinned in the ordinary manner, leaving *all* the bones of wings in their places, and the skin thoroughly annointed with arsenical soap. The neck should then be stuffed with chopped tow or cotton to its natural dimensions. The upper points of the humeri should be tied together at a distance from each other equal to that of the same when fixed in their sockets, otherwise the distance between the shoulder joints. The skin should next be filled with cotton or tow, and the incision sewed up, the legs turned inwards, crossed, and tied in this position, with a label attached containing descriptions.

One of the most efficacious methods of relaxing dried skins, is that employed by the ingenious Mr. Bullock. A box is made of convenient size, the top of which is free to lift on and off, without hinges or fastenings. The sides, top and bottom within are lined with a coating of plaster of Paris, two or three inches thick. When any skins are to be relaxed, fill the box with water, and in this condition allow it to stand over night; in the morning any water remaining can be poured off, and the skins placed within. The lid of the box, being grooved, will shut close, and the wooden sides will prevent evaporation from going on. The box should be set in some damp situation. In twenty-four or forty-eight hours the skins will be sufficiently soft and pliant for mounting. It is necessary before placing the skins within the box, to render the feet and the bill pliable, that these parts should be enclosed in dampened rags or tow. Before moistening, the body should be opened and the inside stuffing taking out with the forceps. Another method is to fill the skin (the former stuffing having been previously removed) with cotton or rags saturated with water, en-

veloping it with a damp cloth, having wrapped the bill and feet as above stated. The former is preferable, as the latter does not relax all the parts equally. In some cases, however, especially with those of the aquatic families, it is necessary to prepare them after the latter plan, and in this condition to place them in the box described above.

The general method pursued in mounting dried skins is the same as that practiced upon fresh specimens. Difficulty is often experienced in placing the leg wires in position from the dry and shrivelled condition of the tarsi; this may be overcome by perforating them with the awl used for that purpose (recommended in the former article upon mammalia) previous to inserting the wires. With many of the skins of South American birds, prepared by the natives, a proper adjustment of the wings is found to be impossible. In this case it is necessary to cut them off close to the body, and fix them anew. In replacing the wings the scapulars should be carefully arranged to effectually conceal the joining of the wings. Any feathers disarranged in the operation should be properly adjusted with the small forceps.—*To be continued.*

THE METHOD OF MANUFACTURING POTTFRY AND BASKETS AMONG THE INDIANS OF SOUTHERN CALIFORNIA.

Pottery.

Among the Kahweyahs (Cahuillos), who, unlike the former Indians of the coast of California, make household utensils of burned clay instead of soapstone, I observed the following mode of manufacturing pottery.

The clay of which their vessels are made is usually obtained from the creek bottoms, and is similar to that used by the Mexicans to make *adobe*, or sun-dried brick. It is a dark sticky humus with a light admixture of sand, or as is the case in the neighborhood of White Water river, the white, fine, dense clay which so effectually discolors the water of that river at the head of the

desert, the beginning of Coahuila valley. The clay, after being cleared of all rocky and land substances, is preserved in dried lumps for use. Of this clay a stiff "dough" is made by adding water and kneading it thoroughly. Some Indians, however, as for instance those of Sonora, mix powdered potsherds with the earth. In the neighborhood of White Water river the clay is very suitable in its natural state and is so used.

The "dough" is formed into cylinders of a foot and more in length, and, according to the size of the vessel to be made, more or less than half an inch in diameter.

The bottom of the vessel, which is usually globular or semi-globular, is made by coiling the cytinders in the desired form. They are then knit and smoothed to the required thickness by the hands, which are placed in such a position that the fingers operate inside the concavity, and the thumbs, pointing towards each other, work on the outside. The bottom of the vessel thus made is then placed in a shallow dish, either of wood or of burned clay, which takes the place of a potter's wheel and enables the worker to turn the vessel as he proceeds without endangering the form. Squatted on the ground, the worker turns the form as the cylinders are coiled into the desired shape, joining them together with the fingers and thumbs, holding the hands in the position already described.

When the vessel has thus been gradually built up, the clay is made compact and smooth by holding a rounded and smooth rock against the wall of the vessel on the inside, and patting the outside with a wooden trowel opposite the rock. The outside is then made even by a wooden scraper, corresponding in shape to the curve of the pot, which is dipped in water to accelerate this work. The dents inside, caused by the supporting rock, are usually allowed to remain. Experts among the manufacturers do away with the smoothing scraper and accomplish the same end with light taps of the trowel, the marks of which are sometimes plainly visible in the burned pottery, especially when done with a slightly corrugated trowel, caused by the protruding fibres of the wood. The narrow neck of the *olla*, or, especially, of the jar used for the transportation of water, which barely admits a hand, is last finished by the same method, but more clumsily, and is left more porous, as rock and trowel can not be used on that portion of the vessel.

The vessel is then put away to dry in the shade before it is exposed to the process of burning.

The kiln consists of a hole dug in the ground, about five feet in diameter and less in depth, the bottom of which is covered with fragments of pottery. When well heated by an abundance of brush fire, the earthen ware is arranged on the potsherds, and is covered with hot ashes. The pit is then closed with bark or grass, supported by green sticks strong enough to bear a subsequent covering of earth without endangering the underlying pottery, and is thus left for several days, until the pit has cooled off, when the burned vessels are taken out. The defects of this kiln sometimes necessitate a second burning, but in old pits, in which the wall is well baked and the heat is better retained than in new ones, good results are obtained with surety.

Among the Sonoras a kiln is used similar to the Mexican bake-oven. This is a structure of *adobe* in the form of a bee-hive, with an opening on top in addition to the firehole below. When well heated, the vessels are properly arranged within and the oven closed at both openings with covers made of earth. The Sonoras also frequently dye their pottery with a red mineral paint before it is exposed to the heat, which produces an even red color, as the process of burning, being sometimes defective, would not alone accomplish this.

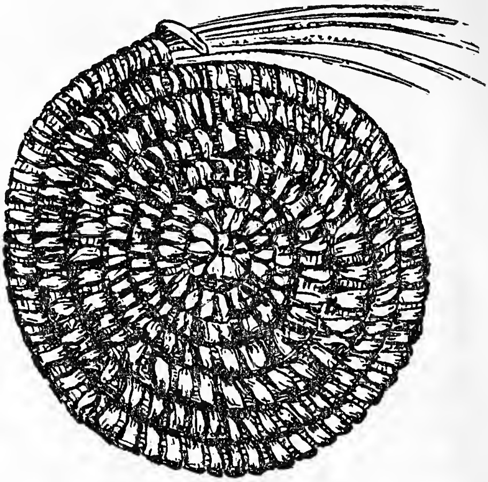
Baskets.

The manufacture of baskets I also observed among the *Techáhet* a tribe of the Cahuillos, at Agua Caliente, Los Angelos Co., Cal., while making researches for the Peabody Museum during the last year, and also on a previous occasion in Northern California and Southern Oregon, while in the employ of the U. S. Coast Survey. Substantially the same method is employed in these several regions, though the material slightly differs, and likewise existed in former times among the Coast Indians of California, as is demonstrated by fragments found in their graves.

The Techáhet use the reed-grass (*Juncus robustus*), which I found growing in the small fresh-water marshes and creek-eddies at the beginning of the desert, and the tall thin grass (*Vilfa rigens*) found thriving with the *Yucca* which flourishes in such great varieties in that neighborhood; both are used in the dried state. The former species is used for binding the body of the basket, which

is made of the latter. The reed-grass is split, and some of it is dyed in different shades, usually brown, with which to produce

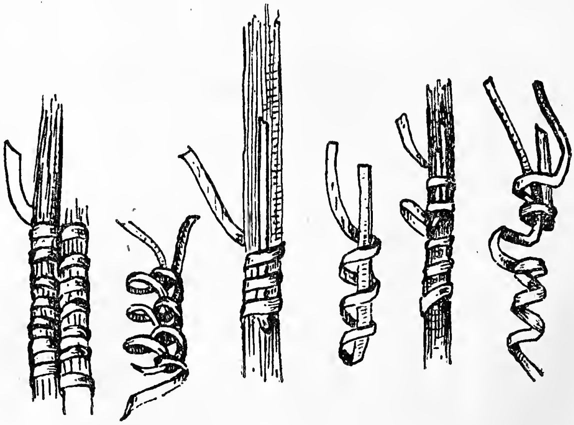
FIG. 1.



Bottom of Basket.

the figures, mostly straight-lined or zigzag. The grass of which the body is made is worked in its natural state.

FIG. 2c. FIG 2a. FIG. 2b.



Method of binding the coils of grass.

The basket progresses from the centre of the bottom, as shown in Fig. 1, which represents that part of natural size for baskets

not exceeding a foot in diameter, while the thickness of the coil of larger ones is increased by adding more of the grass of which it is made. The beginning of the stitch, for which the hole is made by a common bone needle, or borer, is shown in Fig. 2*a*, and is made by fastening one end of the binding by the succeeding overlying stitches, and is thus neatly disposed of on the inside of the basket. Fig. 2*b* shows the manner in which the coils and stitches are arranged and the way they are bound together. When the length of the binding is used up, the end is similarly secured as at the beginning, Fig. 2*c*, or, at the finishing of the basket, under the preceding stitches. The shape of the basket is easily formed by lengthening or shortening the circuits of the coil, and by changing the stitches slightly towards the side of the concavity to be formed. In forming the bottom of baskets the split twigs of a shrub are generally employed in place of *Juncus*, probably for the greater strength. Often this material is used for the sides as well as the bottom, but generally the *Juncus* is used after about a dozen or twenty coils have been made. The *Juncus* is used without splitting, from which is made a coarse basket with loose meshes, similar to a net but without knots.

THE FRESH-WATER AQUARIUM.

(*Continued from page* 13.)

We have seen that the aquarium is to be distinguished from the common fish-globe by its self-supporting character. We have examined in a general way the philosophy of the aquarium and concluded that the rectangular tank was the most useful one to have. Let us now look for a situation for the tank before the specimens are placed within it. It is desirable that the sun should shine upon the tank for at least an hour during the day; an eastern or southern aspect then is the best for this purpose. This is especially true in the winter time, while in summer a northern aspect would be preferred, as the water in the aquarium is apt to be overheated by the sun during the hot months. One trouble

which arises from to much sun is this: that the small green plants of conferva grow very rapidly upon the glass and stones, obstructing the view of the inside of the tank, and rendering the stones very hard to clean when taken out. These confervæ do not injure the water at all; they even give out oxygen as other plants, and it seems as if it were a provision of nature, that they should render the glass opaque so as to protect the inmates of the tank from injury. This confervoid growth is not essential to the welfare of the tank if it is properly stocked with other plants, and it is desirable to have as little as possible of it. To effect this, a wide screen, or a simple sheet of brown paper, so placed as to shut out the sunlight from the tank will answer the purpose; or by pulling the window shade down when the sun shines upon the tank; or, what is best, by placing a row of plants with full foliage between the tank and the window, we have other means of obviating the difficulty.

Whether the sun shines upon the tank or not, a fresh-water aquarium should have all the daylight it can get, both for its own welfare and our own convenience in examination. I am convinced that this is correct from my own experience, although Mr. Hibberd, a good authority on aquarial matters, says to the contrary: "A full flood of daylight does more harm than good, a frequency of sunshine is destructive, and the tenants of an aquarium are seen to better advantage in a vessel lighted from above only." Before any specimens are introduced into the tank, it should be thoroughly washed out and the glass cleaned on all sides, as this is the only time when it can be done to advantage. We are sure then that no impurity of any kind will thus far hinder the success of the aquarium. The tank then is ready for the rock-work. This rock-work is useful: first, as a shelter for the animals, some of them being averse to the light if it is strong; second, as a means of concealing the sediment which, without doing any material injury, so mars the beauty of an aquarium; third, as a means for anchoring in their proper place the plants we put in; fourth, and lastly, to make the effect of the aquarium more like nature.

It is generally thought that most water-plants, to do well in an aquarium, must have soil to grow in as well as land-plants, and that a layer of earth or sand must be spread over the bottom of the tank for the roots; this is found by experience to be a mistake. No earth or sand is required for the plants which grow best in the

aquarium. Either is very apt to spoil the water after remaining in contact with it a short time. Coarse sand is, to be sure, sometimes used when we have animals in the tank whose nature it is to burrow, but even then only in a small quantity placed near a corner of the tank. Some of the small lilies grow better if they have a cubic inch of peat attached to their roots. This small quantity does not injure the water, however long it may remain in it, and is often very useful. In general, however, if the plants are placed right side up, among small stones about the size of a fresh pea, they will grow to any extent, seldom throwing out roots of any kind.

We want, then, a layer of small stones on the bottom, about an inch in thickness; this will be sufficient in which to bury the ends of the plants, and to conceal all the sediment which may collect, at the same time giving depth enough for the mussels to burrow in. The stones used with tar for the tops of houses are about the right size for this layer and on the top of it, some larger stones about the size of an almond may be scattered here and there. As to the color of the stones, this may add greatly to the effect. If we can have the patience to pick out for ourselves the white and variegated stones from the beaches, we shall be amply repaid by their appearance in water. White stones give a brighter look to the inside of the tank than dark-colored ones, and they show off the green plants much better; but they also show the green confervoid growths growing upon them much sooner than dark stones, and are much harder to clean after they once become green. This difficulty of cleaning can be remedied by having two sets of stones, one being buried in damp sand while the other is in use. Were the beautiful stones of almost fabulous brilliancy which cover the San Mateo beach, near San Francisco, as common on our shores, we should have a famous groundwork for the aquarium. After the layer of stones has been evenly spread upon the bottom of the tank, we may arrange the rock-work in the centre in the following way, which seems to be a good one, because by it we avoid using cement, which makes a tank look altogether too artificial and we get a strong piece of work, giving sufficient shelter to the animals and one that will not be likely to fall down and injure the glass of the tank. It consists, essentially, of a series of three stone bridges, the one above being smaller than the one below. If the tank is small one or two bridges may be all sufficient.

We take then two or more pieces of stone, having very rough edges so as to look more natural and place them about a foot apart, if the tank will admit of such a width, making a height of about two inches. Upon the tops of these pillars of support we place a thin flat stone, large enough to rest firmly on them and even lap over an inch or so on each side; then upon this flat stone we place the pillars of another bridge, having the next flat stone somewhat smaller than the other and so on until we have made so many bridges, that the top of one will just reach the surface of the water. The distance between these flat stones may vary according to the fancy of the builder. The top stone makes a little island and gives such animals as tritons and turtles an opportunity to come out and take the air, or sun themselves. Another use this top stone may be put to is this, — to support a small collection of marsh plants, making a great ornament to the aquarium. Many of the fern-like mosses found growing on the rocks in damp places in the woods, or the swamp cowslips or violets, or the delicate plants of sundew (*Drosera rotundifolia*), or some of the kinds of arrowheads (*Sagittaria*), do perfectly well if planted in a very small quantity of soil upon this top stone. Our native pitcher plant (*Sarracenia purpurea*), and the red cardinal plant (*Lobelia cardinalis*), seem especially adapted for this purpose. If we take the former plant up in the fall and keep it growing upon the top stone until March, it will then begin to throw out its buds, and, before long, blossom most curiously. The latter plant seems to to do best when taken up with the buds just appearing, and it will last long enough in flower to repay one for all the trouble of transplanting it. Various other means of beautifying the top stone may be adopted. If we wish a small collection of tropical ferns, and have room enough, we may cover them with a glass shade and have a diminutive Wardian-case, forming a part of the aquarium.

It is the custom with many to make a mound of marine-shells, or of coral, in the centre of the tank; besides being dangerous to the water from the difficulty of getting them perfectly clean, they seem quite out of place, not only because thay are foreign to fresh water, but because it seems that the aquarium should be a place for living, not for dead specimens. It is far better to avoid putting in any shells, however beautiful they may be in the cabinet. Having completed the rock-work and washed every stone carefully as it is put in, the plants are next to be attended to. In

fresh-water plants we have for the most part to deal with the different shades of green, while in salt-water plants the colors are varied and brilliant. There is, however, this advantage in fresh-water plants, that almost all of them will grow well in a properly managed aquarium, while only the very green ones of the salt-water plants are likely to flourish under the same conditions. One great drawback to the growth of aquarial plants is the change of the water from a higher to a lower temperature, or the reverse. It is also sometimes found difficult to grow several kinds in one tank successfully. The common water-cress (*Nasturtium officinale.*), for example, found mostly in cold springs and their brooks, will do well with water; starwort (*Callitricoe verna*), a plant growing in a similar situation, if the water in the tank is kept at a low temperature; but at a moderately high one grows long and rank, and finally decays. So again many plants which grow in brooks or rivers, and have become accustomed to be constantly moved by a current, when placed in the still water of an aquarium inevitably mould away.

The question is often asked what kinds of plants are the best for the aquarium, and where are they found? Most writers on this subject give long lists of plants, which are useless to those who are unacquainted with the botanical names. To the majority of people not even the common names of most water plants are known, and to such it becomes very perplexing to make a selection from a list bare of any description. Although it is insisted by some that the tank should not be filled with every kind of plant that the collector can obtain, yet it seems as if there was no sound reason why all the plants that flourish in the aquarium should not be placed therein. In a properly managed aquarium there are very few water plants which will not do well; the few exceptions being found in the lilies, which require a deeper soil than is convenient in the tank, and in those plants accustomed to a lower temperature of the water than is easy to maintain. Apart from these take any of the green plants found in ponds, and placing them in the tank, watch their growth, and a few weeks trial will determine their value whether they are of use or for ornament. It is hardly practicable to arrange the plants in the tank in botanical order, the room is so limited. A better way, if we wish such an arrangement, would be to devote a separate tank to each variety. This could easily be done in what is called the

cabinet aquarium, which will be noticed hereafter. An affair of this sort enables one to have a large collection of plants, changing the light or temperature as the case requires.

Before giving the names of a few of our native plants which are favorites in the aquarium, it may be well to say a few words as to the locality in which most are found, for to one who takes a real interest in the aquarium, it will not suffice to pick out a few plants here and there from the collections of dealers in specimens, which by the way are not numerous. Half of the pleasure, to say nothing of the profit in having an aquarium, is in hunting for one's own specimens, and in realizing that there is much more life in the waters of a pond than we before imagined. To those who pass some time during the year in the country, there will be ample means for collecting specimens in the ponds near by; but to residents of cities the task will not be so easy, although it will depend a good deal upon the facilities for getting into the country. Take for example the two cities of Boston and Worcester. A ride of fifteen minutes in the steam cars will take one from the former place to Fresh Pond, in Cambridge, which is rich in aquarial specimens. The brooks in the marshes, near what is called the "Glacialis," abound in larvæ, fresh-water snails, and the smaller specimens, while Fresh Pond itself contains nearly all our common water plants. Tritons, or fresh-water newts, are not to be found there, but not so with small turtles, which at certain seasons of the year, especially in the fall, are quite common. There is, I believe, no place eqnally near Boston, which has so complete a collection of aquarial specimens as Fresh Pond. Worcester offers great advantages to the collector in its beautiful Long Pond, or, as it is recently called, Lake Quinsigamond. The pond itself has few plants on account of its depth, but if we follow it up to the river which helps to form it, and then to the other pond above, near the place where a few years ago the old mill house stood, we shall find all the specimens we could wish for. In this upper pond the plants, instead of growing with the various kinds, mingling recklessly together as usual, are found in a general way, with each kind in a large patch by itself as if some one had planted them so, making as it were an aquatic botanical garden. We may go in the opposite direction down the pond, a few miles below the bridge which crosses it, until we come to the dam which separates Long from what is called Half-moon Pond. If it is midsummer,

and early in the morning, we shall find ourselves surrounded by acres of water-lilies, beneath which are the desired specimens. All along from this dam, towards Grafton, a chain of shallow ponds connected by rivers invites our attention, and the scenery alone would be a sufficient inducement to bring the naturalist to the spot. The three kinds of plants which are the best suited for the aquariam, of all our natives, are *Ceraptophyllum demersum; Utricularia vulgaris*, *inflata*, and *minor* ; *Potamogeton natans*, *Claytonii*, and others.*

Besides these plants the floating Duckweed (*Lemna trisulca*) is a very valuable addition to the collection. Water-lily plants are not only difficult to make grow, but their leaves are apt to be ill-proportioned to the size of the tank. In duckweed both of these troubles are done away with, for we have a plant which is easily grown, and one which gives to the aquarium the appearance of a miniature pond. It is found in brooks at the roadside and in shallow ponds ,especially in the autumn season. The *Limnocharis Humboldtii*, a lily sometimes grown in tanks in greenhouses, is also a good plant for the aquarium, where, if care be taken, it will blossom freely. There is a moss-like plant of bluish green color, found growing on stones in brooks, and under bridges in shady places in the water. It is called *Fontinalis antipyretica*, and it is one of the few brook plants that will do well in the aquarium. The water buttercup, *Ranunculus aquatilis*, has only its

* They are thus described by Dr. Gray. (Manual of Botany of the Northern States. By Asa Gray. 1867.)

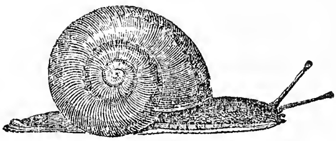
"*Ceratophyllum:* Hornwort. Sterile flowers of 12–24 stamens with large sessile anthers. Fruit an achemium, beaked with the slender persistent style. Herbs growing under water in ponds or slow flowing streams. The sessile leaves cut into thrice-forked thread-like rigid divisions (whence the name from κέρας, a horn, and φυλλον, a leaf)."

"*Utricularia:* Bladderwort. Lips of the 2-parted calyx entire or nearly so. Co. rolla personate, the palate on the lower lip projecting, often closing the throat. Anthers convergent, aquatic and immersed, with capillary dissected leaves bearing little bladders, which are filled with air and float the plant at the time of flowering; or rooting in the mud, sometimes with few or no leaves or bladders (name from *Utriculus*, a little bladder)."

Potamogeton: Pond-weed. Flowers perfect. Sepals 4, rounded, valvate in the bud. Stamens 4 opposite the sepals; anthers nearly sessile, 2-celled. Ovaries 4 (rarely only one), with an ascending campylotropous ovule. Stigma sessile, or on a short style. Fruit drupe-like when fresh, more or less compressed; endocarp (nutlet) crustaceous. Herbs of fresh or one in brackish ponds and streams, with jointed, mostly rooting stems, and 2-ranked leaves, which are usually alternate or imperfectly opposite. The submersed ones pellucid, the floatlng ones often dilated and of a firmer texture (an ancient name composed of ποταμός, a river, and γειτωη, a neighbor, from their place of growth)."

beauty to recommend it, for it hardly survives the winter in the tank. A plant of the Frog's-bit family, *Anacharis Canadensis*, is another excellent one for the aquarium. It gives to the fresh-water aquarium an appearance similar to that which the *Ulva latissima* gives to the marine tank.

Having made a collection of plants, and thoroughly washed them, the next thing is to arrange them in the tank. This arrangement must be according to the taste of the collector. One way, perhaps as good as any, is to make four bunches of plants of suitable size, and place one in each corner of the tank if it is rectangular; they do not then obstruct the view of the tank; they take up the room which is the least valuable of any, and yet can be seen to greater advantage. As the plants grow the tops of the branches meet and form an arch of green on all sides of the rock-work in the centre. They may be held in position, by fastening to them, by a thread or fine piece of string, a small stone of sufficient weight to anchor and keep them in place. If this is not done, and the plants are left to themselves or with the ends of their stems simply held down by a stone placed over them, we shall find them continually being turned upside-down by the mussels, turtles, or other live stock of the aquarium.— *To be continued.*



ANNOUNCEMENTS.

We have been requested, by many of our friends, to add to the Naturalists' Quarterly a department where books and pamphlets relating to local history, genealogy and kindred subjects may be brought to notice and made accessible for scholars and amateurs in these special lines of investigation.

Salem is an old historic town in one of the oldest counties of one of the oldest states of the union, and is the place where the records of the county of Essex are deposited. Many come here to examine these records, and largely on this account an establishment of this character would naturally be expected to take root and flourish.

As in many of the old towns of Massachusetts, so in Salem; the children, from the early settlement even to the present time, have been wont to leave the old homestead to colonize new places, or to seek the centers of trade, commerce or manufactures.

At first, steps were directed to the interior of Massachusetts and the banks of the Merrimac, then, the valleys of the Connecticut, the Housatonac, the Hudson, and the Mohawk to the Lakes, then scattering over the great basin of the Mississippi crossing over the slopes of the Rocky Mountains to the shores of the Pacific.

The boundary line of the old Massachusetts Bay colony, described in the charter of 1629—"*north*, three miles north of the northernmost point of the Merrimac River—from ocean to ocean; *south*, three miles south of the southernmost point of Charles River—from ocean to ocean." Little did the old emigrant, who was living under this charter granted by Charles I to Matthew Cradock, John Endicott, John Winthrop and others, imagine that ere the lapse of two and one-half centuries this vast territory, under one government divided into states and territories, would be covered with a net-work of iron bands and telegraph wires, dotted with populous and flourishing cities and towns, the lakes and rivers teeming with a large and increasing inland commerce and its soil producing an immense quantity of agricultural and mineral wealth.

With this growth of material prosperity, follows a development for the study of the fine arts, the varied sciences, literature and historic lore. The man of wealth, or one or more members of his family, seek repose in some of these elevating studies, and they, as wave after wave in a series of years throws them upon these places so abounding in this world's wealth, soon become desirous of retracing the steps of their ancestral march to the old home on the rugged shores of New England

where those of the first generations obtained their scanty livelihood from the land, or from the briny deep.

The various stopping places in this journey, where perhaps a tarry of a generation or two may have been made, and the first home in America are so many "meccas" where the returning traveller would be desirous of pausing to clothe in living forms these old departed worthies, the places they trod and the fields they cultivated; and the buildings in which they lived, if any should be spared from the wreck of time, are to such, hallowed places. These feelings are the natural promptings of our nature and those who are not thus endowed are exceptions to this common ruling sentiment.

To aid in thus perpetuating the memories of our ancestors and tracing the development of the growth of our common country from these few places,—especially those located within the limits of the county of Essex—the germs, as it were, from which has evolved by constant accretions the country of to-day—is one of the leading objects of the Essex Institute, and the various publications that have been printed under its direction, treating on these and kindred subjects, will be noticed from time to time in these pages. How much the Institute has done can be seen by visiting its rooms in Plummer Hall, Salem, or in examining its various publications. What progress it will make in the future will largely depend upon the encouragement and support from the citizens of the county, from those who have spent their youth and early manhood here, receiving their education and imbibing those principles which have enabled them to be successful in their respective callings in the places of their adoption, and from that class of large-hearted persons whose mission on this earth appears to be the encouragement of all movements, that tend to the advancement of general culture and the happiness of mankind.

A MONOGRAPH of the Medusæ by Ernst Haechel, Professor at the University of Jena, published by Gustav Fischer, Jena, has just come to notice, of which Professor Lankester says: "This is one of the most beautiful books of which the Science of Zoology, which is rich in beautiful books, can boast. It need hardly be said that this splendid work is one which every Zoologist must study and enjoy."

Nature, March 4, 1880, says of it . . . "he has not proposed to himself to trace the individual life-history of the Medusæ. He takes them as he finds them and whilst giving us in the first part alone 20 quarto plates of drawings mostly from life, exposes their agreements and variations of structure in the most masterly, exhaustive and logically conceived treatise which it has been our lot to encounter in Zoological literature."

This class of animals have received comparatively little attention at the hands of naturalists generally, Louis Agassiz's contributions to the Natural History of the Acalephæ of North America, Alexander Agassiz's Revision of the Acalephs, and McCready,s papers in the Proceedings of the Elliott Society of Natural History, Cfiarleston, S. C., being the only works of any importance which have appeared in America. The peculi-

arities of their life-history are such as to render them especially interesting to the student of nature and will richly compensate him for his trouble in investigation.

THE Boston Society of Natural History has announced its intention to publish as a part of the celebration of its fiftieth anniversary, a handsome quarto volume containing a series of illustrated articles in different branches of Natural Science, with a brief sketch of the Society's history. The volume will probabiy contain several hundred pages and many plates, and will be issued if a sufficient number of subscribers can be obtained. The price of the volume will be fixed at $10. Subscriptions can be sent to the Secretary of the Society, Edward Burgess.

A SIXTH edition of Carpenter's "The Microscope and its Revelations," is in preparation and will be ready next fall. The fifth edition is out of print.

"How to see with the Microscope" is the title of a book now being published by Prof. J. Edward Smith.

"THE Science Advocate," is the title of a Quarterly publication by the Natural Science Society of Atco, New Jersey, Henry A. Green, Editor. A copy of the issue for April is before us, which contains a number of interesting articles.

NOTES AND QUERIES.

MASTODON REMAINS FOUND IN JACKSON CO., MISSOURI.—*The Kansas City Review of Science and Industry* for March, reports the finding of the tusk and various other osseous remains of a mastodon on a spot, some twenty miles east of Independence, Mo., by Dr. F. A. Ballard. The tusk had evidently been lying where it was found for a very long time, and was in an advanced stage of decomposition, both by the action of the elements and the triturating and grinding process of wagon wheels, crushing it every time they passed over it. One man declared that he had known " that 'ere log o' wood to be there nigh onto forty year, and hearn that a brute animal had died there." Others said that when it was first discovered, it was larger than any sapling found in that county anywhere. But the log proved, as above stated, to be the monster tusk of a mastodon and measured, at the base (from the imprint in the clay), fourteen inches in diameter, or over forty-two inches in circumference and as it lay *in situ* twelve feet in length with a curve of probably two and one-half feet. At the distal end the tusk appeared to have been broken off

and was all of four or five inches thick; there was, probably, at least a a foot of it gone. Three feet of it were found in a state of preservation sufficient to bring away, a segment of which was given by Dr. Ballard to Judge West, who will exhibit it at the Academy of Science—an ulna bone together with others presumably of the feet, we found, but were in a soft condition and could not be handled. Dr. B. intends making further explorations in the locality the coming summer, and he predicts a rare treat for those interested in such matters.

THE DIAPHOTE.—Dr. H. E. Licks of Bethlehem, Penn. has invented an instrument which he calls by this name from two Greek words, *dia* through, and *phos*, light. The instrument consists of a receiving mirror, the wires, a battery and a reproducing speculum. The receiving mirror is an amalgam of selenium and iodide of silver; the reproducing speculum is a compound of selenium and chromium. The wires run to a common galvanic battery and thus connect with the reproducing plate. When the circuit is closed, the rays of light are conducted through an ordinary camera, and the accompanying heat produces chemical changes in the amalgam of the mirror, which, modifying the electric current, cause similar changes in the reproducing speculum.

A CORRESPONDENT to the American Monthly Microscopical Journal reports the following novel Aquarium for Entomostraca. He says, "I use the glass balls such as sportsmen use for trap-shooting, the ones now hanging at my window are of blue glass and the entomostraca are doing well, propagating fast and of course are quite conspicuous, owing to the balls magnifying somewhat. Half a dozen hung at a window make rather a pretty appearance and I have different families in each." This is quite a valuable suggestion to microscopists, as these aquaria will serve as a receptacle for many forms of infusorial life, thus supplying a convenient method for keeping a stock of these ever interesting objects.

WE have just received a circular from Drury College, Springfield, Mo., stating the intention of opening a Summer School of Biology, under the direction of Prof. Edward M. Shepard and Charles H. Ford, the former of Drury College, the latter of the State Normal School, Kirksville, Mo. This is a move in the right direction and we hope to hear of more such. The taste for the study of Natural History is growing rapidly in this country and it should be a matter of congratulation to every one interested in the cultivation and refinement of the race.

THE American Association for the Advancement of Science will hold its Twenty-ninth meeting at Boston, Mass., commencing Wednesday August 25, 1880, at 10 A. M., in the rooms of the Massachusetts Institute of Technology.

A large local committee has been appointed, Prof. W. B. Rogers is chairman, S. A. Scudder and E. Burgess secretaries. Preparations are in progress that will render this meeting one of the most interesting and instructive that have been held. The American Association of Geolo-

gists and Naturalists, from which the present association was formed, held its last meeting in Boston, when the sphere of its operations were enlarged to embrace the Physical Sciences, and in consequence thereof the present name and plan of operations were adopted.

Three meetings have been previously held within the limits of Massachusetts: at Cambridge, in 1849; at Springfield, in 1859; and at Salem, in 1869. A large gathering is anticipated.

DR. THOMAS MAYO BREWER died at his residence in Boston on Friday January 23, 1880. Until within a few weeks he had enjoyed good health. He was born in Boston Nov. 21, 1814 and has always resided in the city of his birth. He graduated at Harvard College in the class of 1835 and received the degree of Doctor of Medicine in 1838 from Harvard, when he commenced the practice of his profession at the north end and was for many years the Dispensary Physician of that section. His leisure hours were devoted to mental culture, though widely apart in their scope and relative bearing, ornithology and general politics occupied his attention. He was associated with Richard Houghton in the editorial department of the Boston Atlas and also with William Hayden. During his editorial life he not only contributed some of the ablest articles that appeared in its columns, but during a residence in Washington for several winters, sent daily letters from the Capitol which were read with great interest. After his retirement from editorial life, he formed a business connection with the firm of Swan & Tileston, which continued under the title of Brewer & Tileston to 1875, when he retired and passed two years abroad.

He took a great interest in educational matters and for many years from 1844, he was on the Boston school committee and was a very efficient and active member.

His position as an ornithologist is well known in scientific circles. In 1839 he edited a new edition of Wilson's ornithology, one volume of a fine work on oology, prepared by him, was published by the Smithsonian Institution, but was suspended on account of the cost. He also wrote most of the biographical portion of the History of North American birds, published by Little, Brown & Co. in 1874. In 1878 he contributed to Scribner's Monthly a series of articles on bird architecture which attracted marked attention. He has recently prepared for Harper's Monthly an article upon Audubon. The most pleasant relations long existed between them, and the great ornithologist honored his friend by naming some new species of birds after him. In the social circle he was justly esteemed and beloved, and there are many who have enjoyed a life long acquaintance with him, who will look in vain among their list of friends, to find one who was more personally loyal to friendship and truth. He was a member of the Massachusetts Medical Society, American Academy of Arts and Sciences, Boston Society of Natural History and a corresponding member of several foreign societies.

THE AMERICAN ACADEMY OF ARTS AND SCIENCES, chartered by the Commonwealth of Massachusetts May 4, 1780. The oldest institution of

the kind in America, excepting the American Philosophical Society at Philadelphia. That was initiated by Franklin and others, before the war for independence; this was inaugurated before the close of that war.

The academy had an honorable origin, and has sustained and still holds an honorable position among the learned societies of the world. It has promoted investigation; it has published nearly thirty volumes of Memoirs and Proceedings; and most of its publications are original contributions to Science in the broadest sense, and to the liberal and useful Arts.

The academy will celebrate its one hundredth anniversary on the 26th day of May 1880. An address will be delivered by the President of the Academy Hon. Charles Francis Adams L. L. D., to be followed by a reception.

Many of its foreign honorary members, as well as its associate members in other parts of the United States, also delegates from kindred societies, are expected to be present on this interesting occasion.

Type Collections of Fossils.—Williams College Museum contains the Collection of the late Ebenezer Emmons, including the original specimen of *Dromatherium*, the oldest known mammal.

The American Museum in New York possesses the collections of Prof. James Hall, and the "Authors types" of Tuomey and Homes work on the later Tertiary of South Carolina.

The Academy of Natural Sciences of Philadelphia possesses the types of Say, Morton, Troost, Isaac and A. C. Lea, Conrad, Leidy and Cope, who have worked on American fossils; while the collections of European remains are very valuable, a large proportion of the types of Sowerby's "Mineral Conchology," Hugh Miller's "Old Red Sandstone," Mantell's "Medals of Creation," and others of Buckland and Charlesworth as well as the celebrated "Bennett collection of fossil sponges." The collection of fossils as a whole is by far the largest and most valuable of any in America and is outranked by but few in Europe.

☞ We would call attention to a fine collection owned by Jon. R. Rollins of Lawrence, Massachusetts. Mr. Rollins is desirous of disposing of the above, and as it embraces a very large number of specimens in all the branches of Natural History, it is a rare opportunity for some of the many Societies to obtain a collection cheap. (See advertisement.)

☞ We have in press, shortly to appear, a work on Seaside Studies, by Mr. James Emerton, the well known naturalist, author of "Structure and Habits of Spiders." The above is the first of a series, "The Naturalists' Handy Series." ☜

BOOKS RECEIVED.

The American Monthly Microscopical Journal, for March and April. *The Medical Annals*, Albany, N. Y. *The Science Advocate*, Atco, New Jersey.

THE

NATURALISTS' QUARTERLY ADVERTISER.

In order to facilitate the purchase of books on Natural History, and to aid in every possible way the growing taste in science, we have established here in the old historic town of Salem, the *Naturalists' Bureau*, for the purpose of bringing together, as it were, the specialist and author, the distant collector and home student. We shall keep for sale works on Natural History, Specimens, Materials, etc., needed by Naturalists in every department. It will be our aim so to conduct our business as to inspire confidence among our patrons, not only by promptness and accuracy, but also by close attention to minor details; making, in every case, the interest of our customer our first consideration.

To Authors do we especially appeal for support in our project, and trust they will aid us by putting their papers into our hands for sale, while we pledge ourselves in return to merit their confidence by punctuality in rendering accounts and close attention to their interests. We have undertaken the project believing that we can make it a valuable and *reliable* adjunct to the scientific interests of the United States.

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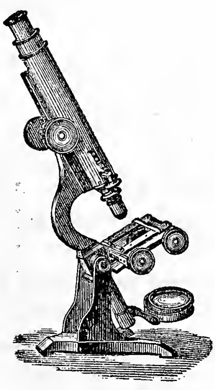

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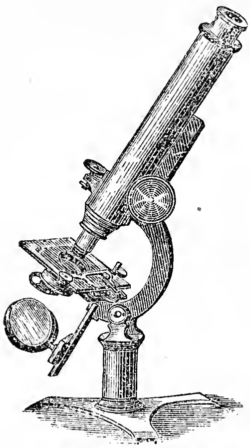

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